

The Differences in Quality for Orion1, Orion2 and Orion3

Industrial Temperature Range

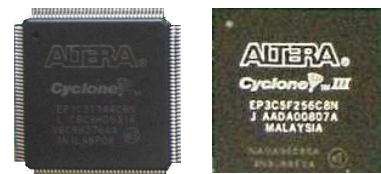
All integrated components mounted on the **FlexDSL** Orion units have the industrial temperature range (-40°C to +85°C). The additional costs for this luxury decision can be reasoned in simplifying the logistics and having less mounting mistakes on the PCB's, because some specialized units will have the need for these wider temperature range. On the other hand the customer will have the advantage that units working a little behind the specified limit will not have any problems.

Our main manufacturers for the industrial grade components are: Infineon (Lantiq), Maxim-Dallas, Marvell, Atmel, Sipex, Conexant, ST Microelectronics, Philips, Spansion. These names assure for real and approved quality. We only use components where we can be sure to have complete and reliable tests about the functionality, especially for memory devices.

Resistors, capacitors and all magnetic components are calculated and approved in the design for the use over the industrial temperature range. And we should not forget to add to this list the quartz oscillator devices, they have to fulfill the frequency and jitter specification as well as the rise and fall time of the edges over the wide temperature range. In some case we even use TCXO (temperature compensated oscillator) instead of an XO (usual oscillator) to really pass all standards over the biggest possible temperature range!

Programmable Devices in Orion1, Orion2 and Orion3

For a lot of communication applications it is an advantage to have more flexibility with RAM and Flash based programmable components to fulfill some specific non standard customer needs. All Software in Orion units can be easy upgraded and with the FPGA we have a possibility to add some complex and real time functionalities. These "on the way" programmable components are more expensive but we like to adjust our units and to have the best solution for our customers.

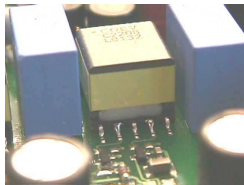


The **Orion™** Chipset from the company Conexant is used in Orion1 and has the advantage to be programmable with different transmission codes (G.SHDSL/CAP/2B1Q), what results in having big opportunities in flexibility and adapting the units to the environment. By the way, the **Orion™** is the Chipset with the largest distribution for G.SHDSL applications (60%).



The **Socrates[®]** Chipset from the company Infineon is used in Orion2 and Orion3 and has the advantage to be programmable with speeds up to 15Mbit/s per copper pair. It is fully compliant with the newest ETSI standard (G.SHDSL, G.SHDSL.bis). The compatibility between all family members Orion1, Orion2 and Orion3 ensure simple integration with current as well as future market requirements. It can also be seen that **Socrates[®]** and **Orion[™]** give us the security to have a second source in G.SHDSL applications. The **Socrates[®]** Chipset has the largest distribution for G.SHDSLbis applications.

Special Approved Components



We strive for low power and high density units. To achieve this goal we try to use on all our units components that are compliant with the strictest standards. A good example is the tiny DSL transformer, designed with a dielectric insulation for 2kV over the industrial temperature range. With an additional glue ribbon on the side of the pads

we are able to withstand 4kV, what makes it usable for central office and customer premise units in harsh environments.

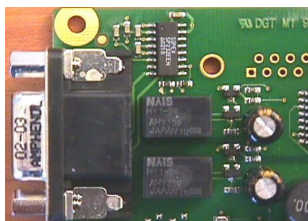
Not only the DSL transformers are designed by us but also the power transformers. It is important to have this knowledge and open the doors for being better in dielectric insulations and better in performance.



Time and Availability Considerations

We will never use on our units ceramic capacitors with cheap dielectric. For example a Y5V dielectric will lose around 50% of capacitance depending on temperature and time. So we decided to consider only stable dielectric (X7R, COG/NPO).

The electrolytic capacitors on the unit are 105°C tested over 2000 hours (long life types) with an extremely low ESR. That will result in an excellent technical behavior as well as in a high reliability.



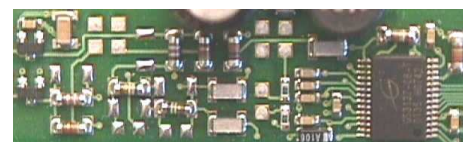
The connectors have a performance level 2 and the contact areas are 0.8µm gold over 1.3µm nickel.



To reach the best production quality with reliable connections when soldering, the PCB has a chemical gold surface.

Analog Design

Instead of using small low cost chip resistors in the analog path, an extremely sensitive part of the unit, we decided to use precision melf resistors. The advantage of this type of resistor is a very good



linearity over the frequency range, lower noise and a better voltage vigor. Low value tolerance, very low temperature coefficients guarantee an excellent behavior. Instead of using ceramic dielectric in the analog special film capacitors are considered for having an extremely good linearity over the specified temperature range. This all means higher cost but best performance in technical behavior and very high reliability.

Right Components for Protection



Insulation is not enough for us. We protect all interfaces with additional specialized components and we take care about the characteristics of each component.

On the main interfaces you will find bigger Metallized Polyester Film Capacitors (MKT) than you will see by other manufacturers. But the advantage of these capacitors is

that they recover themselves by an overvoltage breakdown, they work over a large temperature range and have a big insulation resistance. This characteristic you will not find in ceramic capacitors.

Special TVS diodes, Gas tubes, Common Mode Chokes and correct layouts are just some key factors for our success.

And please take care of our filtering on every interface. This helps to have better performance and to have less electromagnetic distortions.



Design Intelligence

The **FlexDSL** units are designed with a high design intelligence. There is no single point of failure and the low power aspect will result in higher availability of the service. Instead of using a simple linear power supply, a high efficiency DC-DC converter with careful selected components is placed on all units.

Environment Considerations

The production process (ISO 9001:2008) is well documented and every unit has its own test report and history in a file system. This means, that from all mounted components a special lot number is saved and can be tracked. This is very important in cases of failures.

The aspect to be lenient with the environment we strive for a lead-free production process whenever possible, what begins with sourcing lead-free components from leading high quality manufacturers. Having a powerful components sourcing system with a certain components stock and a manufacturer in place prevents us from long transportation ways and results in a very good availability.

Conclusion about Design

- Components have industrial temperature range (-40 °C to +85 °C)
- Reliable manufacturers are selected with a quality system
- Components never run on the limit because of better specification
- Programmable and flexible design, customizing is possible

- High-class chipsets leads to interoperable second sources
- Higher dielectric insulation on interfaces than asked by standards
- High reliability because quality components and intelligent design
- Additional approvals than asked by official standards/norms
- Design intelligence, protection design with right components (recovering)
- Design Intelligence, efficient DC/DC converter on every unit
- Best possible filtering and low electromagnetic distortion

Real non Standard Features Compared to Competitors

- Complete solution design, including repeaters, including remote power
- Remote power with 120VDC and also 200/350VDC is available
- Special digital PLL algorithm for wander reduction makes possible very long loops construction (much more than 8 repeaters are possible) and stable clock transmission for critical applications.
- Wetting current for exhausted copper lines
- Redundant systems, no single point of failure, every unit has its own power supply
- High quality mechanics for industrial use, customized mechanics possible
- Special Clocking modes for E1 interfaces
- Additional Layer2 Switch functionality
- Very reliable, robust and extremely long-term delivery
- Very multifunctional (cross connect, converter, DSL modem) and easy configuration (nice HELP and AUTO modes)
- No need of additional BER testers, this functionality is included in Orion
- Best performance and low power, long life, high quality design

Many thanks and very best regards



Christoph Zuber